



EPA Region 7 TMDL Review

TMDL ID: KS-MC-04-LM045201
Document Name: ROCK CREEK LAKE

State: KS

Basin(s): MARAIS DES CYGNES BASIN
HUC(s): 10290104
Water body(ies): ROCK CREEK LAKE
Tributary(ies): FORT SCOTT LAKE
Pollutant(s): EUTROPHICATION, NITROGEN, PHOSPHORUS

Submittal Date: 9/5/2007

Approved: Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

The TMDL for Rock Creek Lake was formally submitted by the Kansas Department of Health and Environment (KDHE) in a letter received by the United States Environmental Protection Agency (EPA) on September 5, 2007. Public comments and KDHE's response to those comments were submitted with this package. Revisions to this TMDL were received by email October 26, 2007.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.

The LC is set through the use of a lake eutrophication model (CNET) to target the annual amount of total phosphorus (TP) that Rock Creek Lake can receive to meet its designated uses. The total nitrogen (TN) amount used to set the LC was calculated through models developed by KDHE personnel. To address the identified pollutant (eutrophication), a chlorophyll-a (Chl-a) concentration of 10 ug/L was used to link the concentration of TP and TN to the quantity of eutrophication.

EPA agrees this is an appropriate translator for this TMDL. The desired endpoints under this TMDL will be refined based on additional monitoring and evaluation. Achievement of the endpoints indicates loads are within the LC and WQS will be attained.

Because lake conditions represent responses to environmental load occurring over an extended period of time, expression of the load as an average annual value is the preferred approach found in current scientific limnological literature. Expressing the TMDL in daily time steps would mislead the reader by implying a daily response to change in daily loading. Although a short-term response after a precipitation event could have localized lake effects, Kansas assesses the condition of their lakes over the growing season. The growing season mean is affected by factors such as the following: internal lake nutrient loading, water residence time, wind action, and the interaction between light penetration, nutrients, turbidity, sediment load, and algal response.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If

the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

Designated uses of Rock Creek Lake are:

- Primary Contact Recreation (B)
- Expected Aquatic Life Support
- Domestic Water Supply
- Food Procurement Use
- Industrial Water Supply
- Irrigation Use
- Livestock Watering Use
- Groundwater Recharge

WQS-

Nutrients – Narratives: The introduction of plant nutrients into streams, lakes or wetland from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life (KAR 28-16-28e(c)(2)(B)).

Narrative: The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating, or emergent aquatic vegetation. (KAR 28-16-28e(c)(7)(A)).

Eutrophication:

Chl-a water quality endpoint is 10 ug/L Chl-a.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

The State of Kansas does not have numeric criterion for nutrients in their WQS.

A concentration of 10 ug/L Chl-a is needed to attain full support of all beneficial uses. A load reduction for TP (5,091 lbs/yr down to 2,864 lbs/yr) and TN (60,000lbs/yr down to 49,090 lbs/yr) is required to reach the endpoints for Rock Creek Lake. This reduction of TP and TN is an established link in the reduction of Chl-a concentrations. Chl-a concentrations are linked to eutrophication through Trophic State Index (TSI).

The CNET model was used to calculate all phosphorus loadings. Models developed by KDHE personnel were used to calculate all nitrogen loadings.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

There are no permitted point sources (National Pollution Discharge and Elimination System -NPDES or Confined Animal Feeding Operation - CAFO) in the Rock Creek Lake watershed. The most likely source contributor is runoff from agricultural fields and pastures. Some air deposition has been indicated through modeling. Eutrophication is generally a biological response of a lake to elevated nutrients, organic matter, and/or silt. Nutrient loads can come from a variety of sources, including wastewater treatment plant effluent, untreated sewage (or septic systems), urban storm water runoff, animal waste, pasture runoff, and cropland

runoff.

EPA agrees that all known sources have been considered for this TMDL.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2(i)]. If this is a phase II TMDL the change in LC will be documented in this section.

The CNET model was used to estimate the current and potential loads of phosphorus to Rock Creek Lake. Models developed by KDHE personnel were used to estimate the TN concentrations. Nonpoint sources are the main contributors for the nutrient impairment. The LC is 20.82 lbs/day phosphorus and 361 lbs/day nitrogen. All loading is assigned to nonpoint source contributors minus an MOS.

TMDL/LC (lbs/day) phosphorus = 0 WLA + 18.7 LA + 1.9 MOS + 0.22 atmospheric deposition.

TMDL/LC (lbs/day) nitrogen = 0 WLA + 325 LA + 36 MOS.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

There are no permitted point sources in the Rock Creek Lake watershed. A WLA of zero is assigned for phosphorus and nitrogen under this TMDL.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

The LA for in this TMDL is 2864 lbs/yr (21 lbs/day) phosphorus and 49,090 lbs/yr (361 lbs/day) nitrogen. The LA is divided to include atmospheric deposition of 31 lbs/yr (0.23 lbs/day) and 2850 lbs/yr (18.7 lbs/day) from all other nonpoint source loading for phosphorus. The LA is further divided to include 49,090 lbs/yr (325 lbs/day) all nonpoint source loading for nitrogen. TP and TN reductions are required from the current watershed conditions. This reduction of TP and TN loadings will also reduce Chl-a concentrations.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

An explicit 10% MOS was established at an annual rate of 286 lbs/yr (1.9 lbs/day) phosphorus load and 4,909 lbs/yr (36 lbs/day) nitrogen taken from the total LC to ensure that adequate load reduction occurs.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

This TMDL was developed based on Chl-a contributions to generalized lake conditions. The annual targets should result in WQS attainment regardless of the season. Seasonal variation has been incorporated in this

TMDL since the algal growth peak occurs in the summer months.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

Public Meetings: Public meetings to discuss TMDLs in the Marais des Cygnes Basin have been held since 2001. An active Internet site was established at <http://www.kdheks.gov/tmdl/public.htm> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Marais des Cygnes Basin from June 2007 until August 2007.

Public Hearing: A Public Hearing on these Marais des Cygnes TMDLs was held in Fort Scott, KS on May 31, 2007.

Basin Advisory Committee: The Marais des Cygnes Basin Advisory Committee met to discuss these TMDLs on June 22, 2006 in Pomona, November 29, 2006 in Williamsburg, December 18, 2006 in Fort Scott, January 30, 2007 in Ottawa, March 13, 2007 in Fort Scott, and May 17, 2007 in Ottawa.

Comments and the KDHE responses to the comments were formally submitted to EPA with this package dated September 5, 2007.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

KDHE will continue sampling Rock Creek Lake once every four years in order to assess the impairment that drives this TMDL. Based on the sampling results, the impairment status of the lake will be re-evaluated in 2012. Should the impairment status be verified, the desired endpoints under this TMDL may be refined and more intensive sampling may be conducted over the period 2013-2015 to assess progress in implementation.

Reasonable Assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

There are no permitted point sources located in the Rock Creek Lake watershed and the WLA is set at zero. Therefore, reasonable assurances are not required. Reasonable assurance may include numerous authorities and funding through the Kansas Water Plan. Kansas has identified several Federal, State, local, and non-government organizations that may be included in the implementation process.